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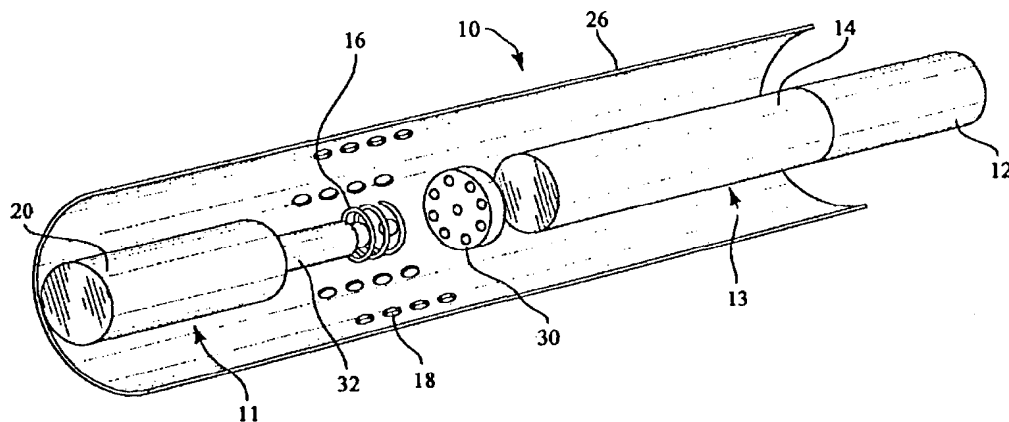
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[Continued on next page]

(54) Title: A SIMULATED SMOKING ARTICLE AND FUEL ELEMENT THEREFOR



(57) Abstract: A simulated smoking article is provided in which a flavour generating medium, such as a commercially available cigarette, is heated with a fuel element including a liquid fuel therein to generate flavours or other components in vapour or aerosol form. A reusable fuel element is inserted in one end of a tubular member and a flavour generating medium, such as a cigarette, is positioned in the opposite end of the tubular member. Spacing between the fuel element and the cigarette is sufficient so that the cigarette is not lit but hot gases come into contact with tobacco or the like in the cigarette to vapourise the flavour components therein.



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A SIMULATED SMOKING ARTICLE AND FUEL ELEMENT THEREFOR

The present invention relates to a simulated smoking article, which article has a fuel element physically separate from an aerosol-generating material, and more particularly a fuel element for a simulated smoking article.

Cigarettes, cigars and pipes are popular smoking articles which use tobacco in various forms as the medium which, upon being ignited provides an aerosol vapour flavourable material to the consumer. In recent years, it has become desirable to provide a smoking device in which the aerosol-generating material, including tobacco, is heated to a temperature sufficient to vapourise the aerosol-generating flavours in the tobacco or pipe materials, but the temperature is not sufficient for combustion.

Many of the smoking devices suggested in the art are adapted to look like conventional smoking articles, such as cigarettes, while other devices have been developed as an alternative to conventional smoking articles. These devices generally attempt to simulate conventional cigarettes without the combustion of tobacco products. For example, many devices include an internal aerosol forming material that is heated by an internal heating element. The heating stimulates the production of a flavourable aerosol for delivery to a user of the device. The internal heating element has conventionally been either a carbonaceous fuel element or an electro-chemical heat source which generate heat on contact with water. In these devices, the fuel element is not capable of being reused. Once the carbonaceous fuel element is lit, the fuel element continues to burn unattended until all the fuel in the element is consumed. In addition, the lit fuel element is very difficult to extinguish, either with water or other means for extinguishment. In an electro-chemical reaction, the difficulty encountered is in stopping the reaction, which only terminates when all of the reactants are consumed. Other devices include an electrical heating element for stimulating an aerosol forming substance. Although these are capable of being turned off between puffs, the electrical heating element requires a battery which requires extra efforts by the consumer and also is generally quite cumbersome.

Some of the earliest patents relating to aerosol-generating smoking articles are to be found in United Kingdom Patent Specification Nos. GB1,033,674 and GB1,083,761 (Battelle Memorial Institute). Other patents which teach smoking articles capable of providing the pleasure associated with cigarette smoking by heating, but not necessarily burning, tobacco or other similar type materials and without delivering considerable quantities of uncompleted combustion products, include, for example, U.S. Patent No. 5,065,776 to Lawson *et al* which teaches a fuel element positioned in heat exchange relationship with a physically separate

aerosol-generating means and U.S. Patent No. 5,144,962 which teaches a non-combustion smoking article having a hollow tube with tobacco therein, the heat vapourising the aerosolising material in the tobacco being a temperature co-efficient thermistor in thermal contact with the tobacco, the thermistor being heated by an electrical current.

What is desirable in the industry is to provide an article that closely simulates a conventional cigarette, but does not require the combustion of tobacco and can be reused, at least in part.

It is an object of the present invention to provide a fuel element for a simulated smoking article as a heat source to vapourise flavouring compounds of a smoking article.

It is another object of the present invention to provide a fuel element for a simulated smoking article which contains a reusable smoking article.

It is a further object of this invention to provide a simulated smoking article which can have substantially the appearance of a conventional cigarette.

It is an even further object of the present invention to provide a simulated smoking article which includes a reusable fuel element in conjunction with a conventional cigarette.

The present invention provides a fuel element adapted for use with a smoking article comprising a fuel tank having an opening in one end, a fuel cartridge disposed within said fuel tank, said fuel cartridge including a liquid fuel, a wick in flow communication with said cartridge, and a glow element adjacent to said wick and operative in response to burning of fuel from said wick.

Preferably the liquid fuel is selected from the group consisting of ethanol and low molecular weight hydrocarbon oils

Preferably the glow element is comprised of copper, brass, platinum or a metallic alloy of these or other metals. Advantageously the glow element is a filament, which filament may be helically coiled, or otherwise arranged around the wick. Alternatively the glow element comprises a chamber containing catalyst material formed of beads or fibrous particles. The catalyst is suitably one or more of copper, brass, platinum-coated ceramic or a coated ceramic-based material.

Preferably the wick is comprised of non-burning fibres or a glass capillary tube or tubes.

Preferably the fuel cartridge comprises a porous medium. Advantageously the porous medium is selected from the group consisting of cellulose acetate, low density polyethylene, ethylvinyl acetate, carbon fibres, cotton or other fabric material.

Preferably the wick is enclosed by a tube extending into the opening of said fuel tank.

Advantageously the tube is a ceramic material.

The present invention further provides a simulated smoking article comprising a tubular wrapper, a flavour generating material disposed within a mouth end of said tubular wrapper, and a fuel element disposed within a distal end of said tubular wrapper and being spaced from said flavour generating material.

Preferably the tubular wrapper is non-combustible on the application of a flame or at least not easily ignited. Suitable materials for the tubular wrapper are ceramic, meerschaum, metal, paper, paperboard, reconstituted tobacco, wood, bamboo, glass, metal foil, and combinations thereof. Any of the foregoing materials may be treated to prevent combustion. Chemical treatments for reducing a propensity for combustion are well known in the art.

Most preferably the flavour generating material disposed within the mouth end of the tubular wrapper is the tobacco rod of a cigarette. Alternative flavour generating sources, such as a porous cartridge containing aerosolisable material, or even a plug of tobacco material, may be used, if desired.

Preferably the fuel element of the simulated smoking article is the fuel element of the present invention.

Advantageously the simulated smoking article comprises a heat diffuser located between the fuel element and the flavour generating material. Preferably the heat diffuser is a wire mesh. The heat diffuser may be treated with a catalyst for converting carbon monoxide into carbon dioxide or another catalyst for converting or eliminating other selected hydrocarbons produced by various types of flames and heating elements. The heat diffuser may be of any type of appropriate material which meets the needs.

The fuel cartridge is suitably a fuel impermeable, non-combustible material, such as a ceramic material. The liquid fuel contained within the cartridge is preferably a clean burning fuel, such as a carbonaceous liquid fuel, for example alcohols, such as ethanol, methanol, isopropanol or propanol, or other low molecular weight hydrocarbon oils, such as pentane or hexane.

Preferably puffing air inlets are provided in the tubular wrapper. Advantageously the air inlets are located upstream of the heat diffuser, in other words in the region where combustion liquid fuel occurs at the glow element.

In order that the invention may be easily understood and readily carried into effect, reference will now be made to the following diagrammatic drawings in which like numerals refer to like parts throughout the several views and wherein:

Figure 1 is a partially fragmentary perspective view of one embodiment of a simulated

smoking article of the present invention; and,

Figure 2 is a longitudinal sectional view of the simulated smoking article of Figure 1.

As shown in the Figures, a simulated smoking article 10 includes a fuel element, designated by the numeral 11, and a flavour-generating material, such as a conventional cigarette generally identified by the numeral 13, disposed within a tubular wrapper 26. The conventional cigarette 13 includes a tobacco rod 14 attached to a filter 12.

The fuel element 11 includes a non-permeable, non-combustible fuel tank 20 filled with a fuel cartridge 24 comprising a porous medium, including a carbonaceous liquid fuel, in this embodiment ethanol, which fuel saturates the porous medium of the fuel cartridge 24. The fuel element 11 also comprises an extended wick 22 and a glow element 16. The fuel element 11 is encased in one end of the tubular wrapper 26, which wrapper is provided with a plurality of puffing air inlets 18 which are located slightly upstream of the glow element 16, so that during use puffing air is brought in through the inlets 18 and provides oxygen for the burning of the fuel in the wick 22. The fuel tank 20 is provided with an open end located at the upstream end of the fuel tank, which open end receives a ceramic tube 32, or the like, which surrounds the wick 22. The glow element 16 is a coil made out of copper wire filament or other heat conducting or glowing materials, such as brass, platinum or a metallic alloy. The glow element 16 is inserted at the open end of the ceramic tube 32. Wick 22, which is usually non-burning fibres or glass capillary tubes, extends generally a short distance, such as 1-2 mm, into the glow element 16, in this case a metal filament. In use, the glow element 16 is lit using a commercially available lighter, such as a butane type lighter.

Also disposed within the tubular wrapper 26 is a heat diffuser 30 which is positioned within the tubular wrapper 26 between the distal end of the flavour generating material 13 and the glow element 16. The heat diffuser 30 serves to deliver the hot gas and hot air coming into the tubular member 26 through the puffing air inlets 18 to the vapour generating material of the tobacco rod of cigarette 13 through holes contained within the diffuser 30. Additionally, the heat diffuser 30 blocks the flame from contact with the cigarette 13 upon the application of suction at the filter end or mouth end of the cigarette by the user. This facilitates preventing ignition and substantial burning of the cigarette 13.

In operation, smoking device 10 is started by lighting the metal filament of the glow element 16 by placing a lighter under the article in the region of the puffing air inlets. The fuel is drawn by the non-burning wick 22 into the region of the metal filament and the presence of a flame causes the fuel to vapourise. The vapourised fuel reacts on the metal filament, which then glows continuously. During the puff by the consumer, air is pulled through the puffing air

inlets 18, across the metal filament, causing combustion of the vapourised fuel. Between puffs, the filament 16 maintains its glow. When ready to extinguish the smoking article, the fuel supply is cut off by sliding a sleeve or the like (not shown), such as a ceramic tube, over the tubular wrapping covering the puffing air inlets 18, thereby cutting the air supply and causing extinguishment. Alternatively a large cap is provided which covers the distal end of the tubular wrapper, including covering the puffing air inlets 18. A further alternative is the combination of the slideable sleeve and a smaller cap placed over the mouth end of the tube when the cigarette is removed.

The fuel element can be detached from the simulated smoking article after use and is re-usable with another cigarette.

In addition, the cigarette is removable from the simulated smoking article and can be smoked as a conventional smoking article, i.e. combusted upon application of a flame, if so desired.

CLAIMS

1. A fuel element adapted for use with a simulated smoking article, said fuel element comprising a fuel tank having an opening in one end, a fuel cartridge disposed within said fuel tank, said fuel cartridge including a liquid fuel, a wick in flow communication with said cartridge, and a glow element adjacent to said wick and operative in response to burning of fuel from said wick.
2. The fuel element of Claim 1, wherein said liquid fuel is selected from the group consisting of ethanol and low molecular weight hydrocarbon oils.
3. The fuel element of Claim 1 or 2, wherein said glow element is copper, brass, platinum or a metallic alloy.
4. The fuel element of Claim 3, wherein said glow element is a filament.
5. The fuel element of any one of Claims 1 to 4, wherein said fuel cartridge includes a porous medium.
6. The fuel element of Claim 5, wherein said porous medium is cellulose acetate, low density polyethylene, ethyl vinyl acetate, carbon fibres, cotton or other fabric materials.
7. The fuel element of any one of Claims 1-6, wherein said wick material is non-burning fibres or glass capillary tubes.
8. The fuel element of any one of the preceding claims, wherein said air inlet holes are located upstream of said glow filament.
9. The fuel element of any one of Claims 1, 4 or 5, wherein said glow element comprises a chamber containing catalyst material formed of beads or fibrous particles.
10. The fuel element of Claim 9, wherein said catalyst is copper, brass, platinum coated ceramic or a coated ceramic based material.
11. The fuel element of Claim 5, wherein said wick and said porous medium are the same material.
12. The fuel element of any one of the preceding claims, wherein said wick is enclosed by a tube.
13. The fuel element of Claim 12, wherein said tube is a ceramic.
14. A simulated smoking article comprising a tubular wrapper, a flavour generating material disposed within a mouth end of said tubular wrapper, and a fuel element disposed within a distal end of said tubular wrapper and being spaced from said flavour generating material.
15. The simulated smoking article of Claim 14, wherein said flavour generating material is

a cigarette.

16. The simulated smoking article of Claim 14 including puffing air inlets in said hollow tube upstream of said fuel element.
17. The simulated smoking article of Claims 14, 15 or 16 wherein said flavour generating material is tobacco.
18. The simulated smoking article of Claims 14, 15, 16 or 17 including a heat diffuser between said fuel element and said flavour generating material.
19. The simulated smoking article of Claim 18 wherein said heat diffuser is a wire mesh screen.
20. The simulated smoking article any one of Claims 14-19 wherein said hollow tube is ceramic.
21. The simulated smoking article of Claim 14, wherein said fuel element comprises a fuel tank having an opening in one end, a fuel cartridge disposed within said fuel tank, said fuel cartridge including a liquid fuel, a wick in flow communication with said cartridge, and a glow element adjacent to said wick and operative in response to burning of fuel from said wick.
22. The smoking device of Claim 21, said liquid fuel being selected from the group consisting of ethanol and low molecular weight hydrocarbon oils.
23. The smoking device of Claim 21 or 22, said glow element being copper, brass, platinum or a metallic alloy.
24. The simulated smoking article of Claim 23, wherein said glow element is a filament.
25. The simulated smoking article of Claim 21, wherein said fuel cartridge includes a porous medium.
26. The simulated smoking article of Claim 25, said porous medium being cellulose acetate, low density polyethylene, ethyl vinyl acetate, carbon filters, cotton, or other fabric materials.
27. The simulated smoking article of any one of Claims 21-26, said wick being non-burning fibres or glass capillary tubes.
28. The simulated smoking article of any one of Claims 21-27, wherein air inlet holes are located upstream of said glow element.
29. The simulated smoking article of any one of Claims 21-28, wherein glow element comprising a chamber with catalyst material formed of beads or fibrous particles.
30. The simulated smoking article of Claim 29, said catalyst being copper, brass, platinum coated ceramic or a coated ceramic based material.

31. The simulated smoking article of Claim 25, said wick and said porous media being the same material.
32. The simulated smoking article of any one of Claims 21-31, including a tube surrounding said wick.
33. The simulated smoking article of Claim 32, said tube being a ceramic.
34. The fuel element of any one of the Claim 1-13, wherein said fuel element is received within a tubular wrapper.
35. The fuel element according to Claim 34, wherein said tubular wrapper is non-combustible on the application of flame.
36. The fuel element of Claim 34, wherein said tubular element is comprised of one or more of ceramic, meerschaum, metal, paper, paperboard, reconstituted tobacco, wood, bamboo, glass and metal foil.
37. The simulated smoking article of any of Claims 14-33, wherein said wrapper is non-combustible on the applications of flame.
38. The simulated smoking article of Claim 37, wherein said tubular wrapper is comprised of ceramic, meerschaum, metal, paper, paperboard, reconstituted tobacco, wood, bamboo, glass and metal foil.

AMENDED CLAIMS

**[Received by the International Bureau on 13 March 2003 (13.03.03):
original claims 14 and 21 have been combined; original claim 21 deleted; new claim 38
consisting of a combination of original claims 14 and 15 added; minor amendments to
claims 22 and 23; remaining claims unchanged (3 pages)]**

1. A fuel element adapted for use with a simulated smoking article, said fuel element comprising a fuel tank having an opening in one end, a fuel cartridge disposed within said fuel tank, said fuel cartridge including a liquid fuel, a wick in flow communication with said cartridge, and a glow element adjacent to said wick and operative in response to burning of fuel from said wick.
2. The fuel element of Claim 1, wherein said liquid fuel is selected from the group consisting of ethanol and low molecular weight hydrocarbon oils.
3. The fuel element of Claim 1 or 2, wherein said glow element is copper, brass, platinum or a metallic alloy.
4. The fuel element of Claim 3, wherein said glow element is a filament.
5. The fuel element of any one of Claims 1 to 4, wherein said fuel cartridge includes a porous medium.
6. The fuel element of Claim 5, wherein said porous medium is cellulose acetate, low density polyethylene, ethyl vinyl acetate, carbon fibres, cotton or other fabric materials.
7. The fuel element of any one of Claims 1-6, wherein said wick material is non-burning fibres or glass capillary tubes.
8. The fuel element of any one of the preceding claims, wherein said air inlet holes are located upstream of said glow filament.
9. The fuel element of any one of Claims 1, 4 or 5, wherein said glow element comprises a chamber containing catalyst material formed of beads or fibrous particles.
10. The fuel element of Claim 9, wherein said catalyst is copper, brass, platinum coated ceramic or a coated ceramic based material.
11. The fuel element of Claim 5, wherein said wick and said porous medium are the same material.
12. The fuel element of any one of the preceding claims, wherein said wick is enclosed by a tube.
13. The fuel element of Claim 12, wherein said tube is a ceramic.
14. A simulated smoking article comprising a tubular wrapper, a flavour generating material disposed within a mouth end of said tubular wrapper, and a fuel element disposed within a distal end of said tubular wrapper and being spaced from said

flavour generating material, said fuel element comprising a fuel tank having an opening in one end, a fuel cartridge disposed within said fuel tank, said fuel cartridge including a liquid fuel, a wick in flow communication with said cartridge, and a glow element adjacent to said wick and operative in response to burning of fuel from said wick.

15. The simulated smoking article of Claim 14, wherein said flavour generating material is a cigarette.
16. The simulated smoking article of Claim 14 including puffing air inlets in said hollow tube upstream of said fuel element.
17. The simulated smoking article of Claims 14, 15 or 16 wherein said flavour generating material is tobacco.
18. The simulated smoking article of Claims 14, 15, 16 or 17 including a heat diffuser between said fuel element and said flavour generating material.
19. The simulated smoking article of Claim 18 wherein said heat diffuser is a wire mesh screen.
20. The simulated smoking article any one of Claims 14-19 wherein said hollow tube is ceramic.
21. The simulated smoking article of any one of Claims 14-20, said liquid fuel being selected from the group consisting of ethanol and low molecular weight hydrocarbon oils.
22. The simulated smoking article of any one of Claims 14-21, said glow element being copper, brass, platinum or a metallic alloy.
23. The simulated smoking article of Claim 22, wherein said glow element is a filament.
24. The simulated smoking article of any one of Claims 14-23, wherein said fuel cartridge includes a porous medium.
25. The simulated smoking article of Claim 24, said porous medium being cellulose acetate, low density polyethylene, ethyl vinyl acetate, carbon filters, cotton, or other fabric materials.
26. The simulated smoking article of any one of Claims 14-25, said wick being non-burning fibres or glass capillary tubes.
27. The simulated smoking article of any one of Claims 14-26, wherein air inlet holes are located upstream of said glow element.
28. The simulated smoking article of any one of Claims 14-27, wherein said glow element

comprises a chamber with catalyst material formed of beads or fibrous particles.

29. The simulated smoking article of Claim 28, said catalyst being copper, brass, platinum coated ceramic or a coated ceramic based material.
30. The simulated smoking article of Claim 24, said wick and said porous media being the same material.
31. The simulated smoking article of any one of Claims 14-30, including a tube surrounding said wick.
32. The simulated smoking article of Claim 31, said tube being a ceramic.
33. The fuel element of any one of the Claim 1-13, wherein said fuel element is received within a tubular wrapper.
34. The fuel element according to Claim 33, wherein said tubular wrapper is non-combustible on the application of flame.
35. The fuel element of Claim 33, wherein said tubular element is comprised of one or more of ceramic, meerschaum, metal, paper, paperboard, reconstituted tobacco, wood, bamboo, glass and metal foil.
36. The simulated smoking article of any of Claims 14-32, wherein said wrapper is non-combustible on the applications of flame.
37. The simulated smoking article of Claim 36, wherein said tubular wrapper is comprised of ceramic, meerschaum, metal, paper, paperboard, reconstituted tobacco, wood, bamboo, glass and metal foil.
38. A simulated smoking article comprising a tubular wrapper, a flavour generating material disposed within a mouth end of said tubular wrapper, and a fuel element disposed within a distal end of said tubular wrapper and being spaced from said flavour generating material, said flavour generating material being a cigarette.

FIG. 1

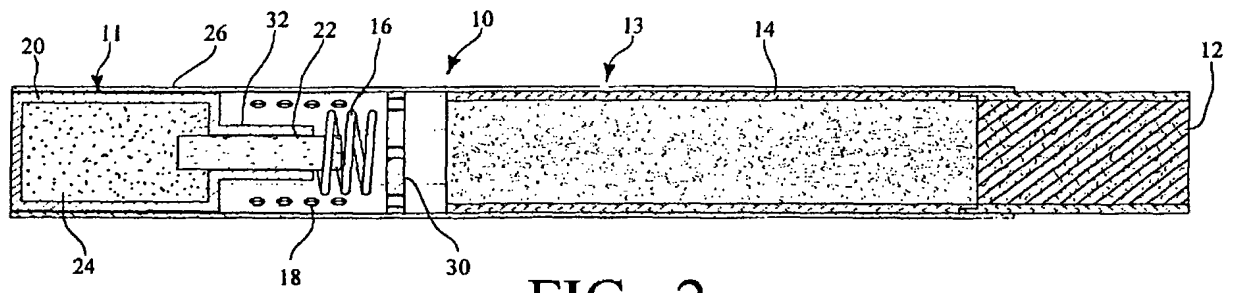
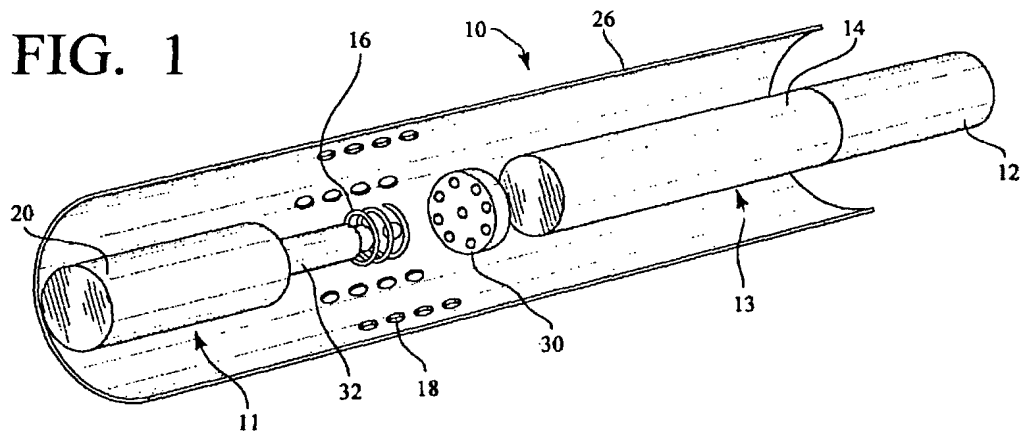


FIG. 2

INTERNATIONAL SEARCH REPORT

In ☐ National Application No

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A24F47/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	the whole document	14, 16, 17
A	US 5 076 292 A (RIDINGS HENRY T ET AL) 31 December 1991 (1991-12-31)	1
X	column 5, line 59 -column 6, line 22	14, 16
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X	column 6, line 22 -column 7, line 49	14
A	US 5 247 947 A (CLEARMAN JACK F ET AL) 28 September 1993 (1993-09-28)	1
X	abstract; figures	14
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

13 January 2003

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INTERNATIONAL SEARCH REPORT

In International Application No
PCT/GB 02/04766

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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